Micrologic™ 2.0A, 3.0A, 5.0A, and 6.0A Electronic Trip Units

Unidades de disparo electrónico Micrologic™ 2.0A, 3.0A, 5.0A y 6.0A

Déclencheurs électroniques Micrologic^{MC} 2.0A, 3.0A, 5.0A et 6.0A

Instruction Bulletin
Boletín de instrucciones
Directives d'utilisation

48049-136-05
Rev. 01, 04/2012

Retain for Future Use. /
Conservar para uso futuro. /
À conserver pour usage ultérieur.

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Micrologic™ 2.0A, 3.0A, 5.0A, and 6.0A Electronic Trip Units

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Instruction Bulletin

48049-136-05

Rev. 01, 07/2012

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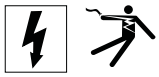
Hazard Categories and Special Symbols

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

ANSI

IEC

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **can result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **can result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury. The safety alert symbol is not used with this signal word.

NOTE: Provides additional information to clarify or simplify a procedure.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

FCC Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. This Class A digital apparatus complies with Canadian ICES-003.

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Section 1—General Information

Introduction

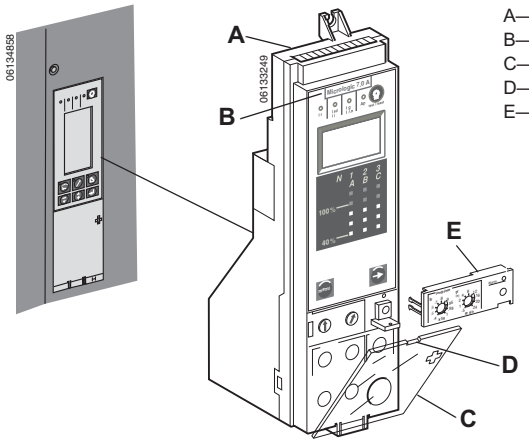
Micrologic™ trip units (A) provide adjustable tripping functions on electronic trip circuit breakers. The product name (B) specifies the level of protection provided by the trip unit.

Micrologic 3.0A

- Type of protection
  - 2—Basic IEC protection (LS0)
  - 3—Basic UL protection (LI)
  - 5—Selective protection (LSI)
  - 6—Selective protection plus ground fault protection for equipment (LSIG)
- Trip unit series
  - 0—Indicates the first version
- Type of measurement
  - None—Provides protection only
  - A—Provides protection plus ammeter measurements

Micrologic trip units are field replaceable to allow for upgrading of the trip unit in the field. For complete information on available circuit breaker models, frame sizes, interrupting ratings, sensor plugs, rating plugs and trip units, see the product catalog.

Figure 1: Micrologic Trip Unit



A—Micrologic Trip Unit
B—Product Name
C—Switch Cover
D—Switch Cover Opening Slot
E—Adjustable Rating Plug

Communications

Micrologic trip units can communicate with other devices if the optional Circuit Breaker Communication Module (BCM) is installed. For information on the communication module, see the product catalog and Modbus™ Communications System, Data Bulletin 0613IB1201.

Trip Unit Settings

On the face of the trip unit are adjustable switches to allow changing of trip characteristics. Trip units are shipped with the long-time pickup switch set at 1.0 and all other trip unit adjustments set at their lowest settings.

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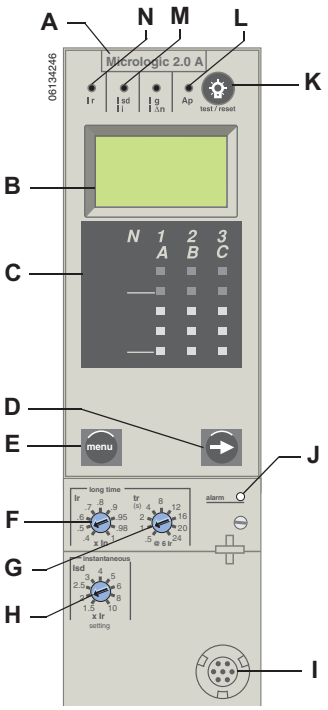
Micrologic 2.0A Trip Unit

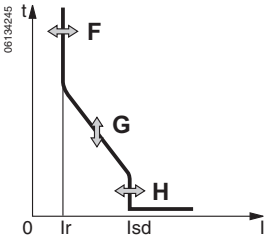
The Micrologic 2.0A trip unit provides basic IEC (LS0) protection and a built-in ammeter.

A. Trip unit name
B. Alphanumeric display
C. Three-phase bar graph
D. Scroll button
E. Menu button
F. Long-time pickup (Ir) switch
G. Long-time delay (tr) switch
H. Short-time pickup (Isd) switch*
I. Test plug receptacle
J. Overload indicator light
K. Reset button for battery status check and trip indicator LED
L. Self-protection indicator light
M. Short-time or instantaneous trip indicator light
N. Long-time trip indicator light

NOTE: For use with IEC circuit breakers only.

Figure 2: 2.0A Trip Unit



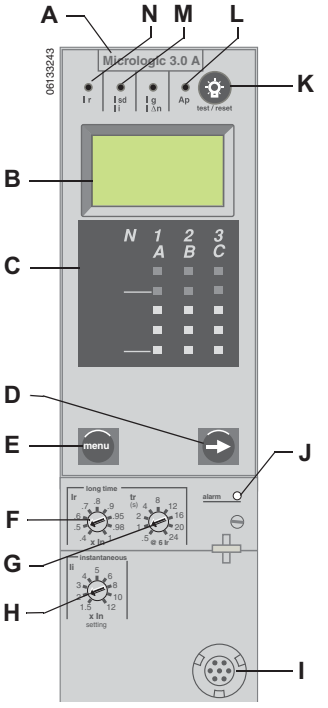


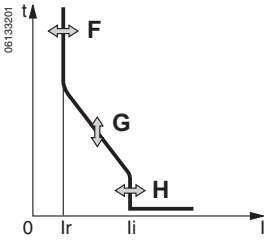
Micrologic 3.0A Trip Unit

The Micrologic 3.0A trip unit provides basic UL (LI) protection and a built-in ammeter.

A. Trip unit name
B. Alphanumeric display
C. Three-phase bar graph
D. Scroll button
E. Menu button
F. Long-time pickup (Ir) switch
G. Long-time delay (tr) switch
H. Instantaneous pickup (Ii) switch
I. Test plug receptacle
J. Overload indicator light
K. Reset button for battery status check and trip indicator LED
L. Self-protection indicator light
M. Short-time or instantaneous trip indicator light
N. Long-time trip indicator light

Figure 3: 3.0A Trip Unit





*Short-time delay is factory set at 0 (no delay), thus short-time pickup provides instantaneous protection.

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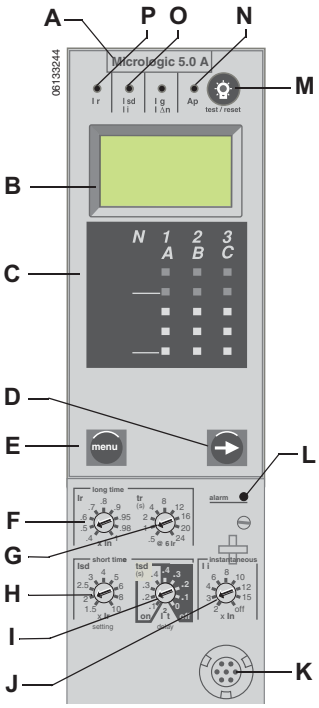
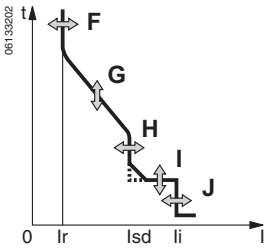
Micrologic 5.0A Trip Unit

The Micrologic 5.0A trip unit provides selective (LSI) protection and a built-in ammeter.

A. Trip unit name
B. Alphanumeric display
C. Three-phase bar graph
D. Scroll button
E. Menu button
F. Long-time pickup (Ir) switch
G. Long-time delay (tr) switch
H. Short-time pickup (Isd) switch
I. Short-time delay (tsd) switch
J. Instantaneous pickup (Ii) switch
K. Test plug receptacle
L. Overload indicator light
M. Reset button for battery status check and trip indicator LED
N. Self-protection indicator light
O. Short-time or instantaneous trip indicator light
P. Long-time trip indicator light

Figure 4: 5.0A Trip Unit





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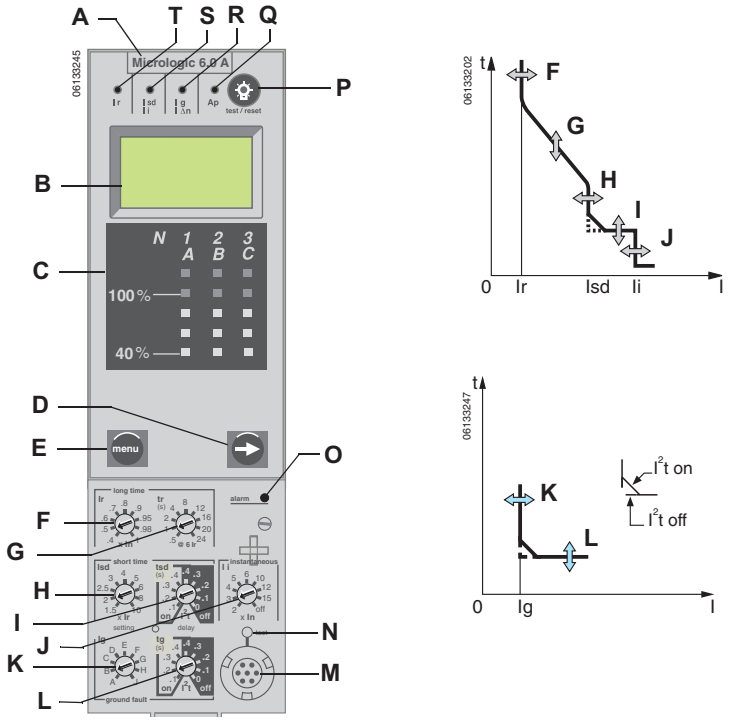
Micrologic 6.0A Trip Unit

The Micrologic 6.0A trip unit provides selective and ground-fault protection for equipment (≤ 1200 A) (LSIG) and a built-in ammeter.

A. Trip unit name
B. Alphanumeric display
C. Three-phase bar graph
D. Scroll button
E. Menu button
F. Long-time pickup (Ir) switch
G. Long-time delay (tr) switch
H. Short-time pickup (Isd) switch
I. Short-time delay (tsd) switch
J. Instantaneous pickup (Ii) switch
K. Ground-fault pickup (Ig) switch
L. Ground-fault delay (tg) switch
M. Test plug receptacle
N. Ground fault push-to-trip button
O. Overload indicator light
P. Reset button for battery status check and trip indicator LED
Q. Self-protection indicator light
R. Ground-fault trip indicator light
S. Short-time or instantaneous trip indicator light
T. Long-time trip indicator light

Figure 5: 6.0A Trip Unit



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Zone-Selective Interlocking

Short-time and ground-fault protection can be interlocked to provide zone-selective interlocking.

Control wiring links several trip units in the distribution network and in the event of a fault, a trip unit will obey the set delay time only if receiving a signal from a downstream trip unit.

If the trip unit does not receive a signal, tripping will be instantaneous (with no intentional delay).

- The fault is cleared instantaneously by the nearest upstream circuit breaker.
- Thermal stresses (I^2t) in the network are minimized without any effect on the correct time delay coordination of the installation.

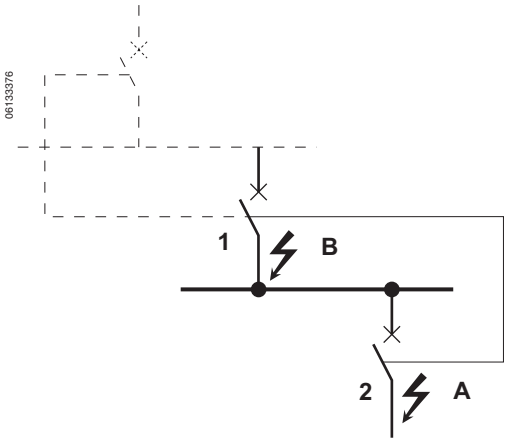
Figure 6 shows circuit breakers 1 and 2 zone-selective interlocked.

- A fault at A is seen by circuit breakers 1 and 2. Circuit breaker 2 trips instantaneously and also informs circuit breaker 1 to obey set delay times. Thus, circuit breaker 2 trips and clears the fault. Circuit breaker 1 does not trip.
- A fault at B is seen by circuit breaker 1. Circuit breaker 1 trips instantaneously since it did not receive a signal from the downstream circuit breaker 2. Circuit breaker 1 trips and clears the fault. Circuit breaker 2 does not trip.

NOTE: Use I^2t off with ZSI for proper coordination. Using I^2t on with ZSI is not recommended as the delay in the upstream device receiving a restraint signal could result in the trip unit tripping in a time shorter than the published trip curve.

NOTE: Setting short-time delay (tsd) or ground-fault delay (tg) to the 0 setting will eliminate selectivity for that circuit breaker.

Figure 6: Zone-Selective Interlocking



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Trip Unit Switches

Long-Time Protection

Long-time protection protects equipment against overloads.

- Long-time protection is standard on all trip units.
- The long-time pickup (Ir) (A) sets the maximum current level (based on sensor plug rating In) which the circuit breaker can continuously carry. If current exceeds this value, circuit breaker will trip after the preset time delay. The long-time pickup (Ir) is adjustable from 0.4–1.0 times the sensor plug rating (In).
- The long-time delay (tr) (B) sets the length of the time that the circuit breaker will carry an overcurrent (below the short-time or instantaneous pickup current level) before tripping. See Table 1 for delay settings.
- Both long-time pickup and long-time delay are on the field-replaceable adjustable rating plug. To change settings to more precisely match the application, various rating plugs are available. For instructions on replacing the rating plug, see Section 5 —Adjustable Rating Plug Replacement.
- For Masterpact™ NT and NW circuit breakers, the In value can be changed by replacing the sensor plug below the trip unit. For further information, see the instructions packed with the sensor plug replacement kit.
- The overload indicator light (C) indicates that the Ir long-time pickup threshold has been exceeded.
- Long-time protection uses true RMS measurement.

Thermal imaging provides continuous temperature rise status of the wiring, both before and after the device trips. This allows the circuit breaker to respond to a series of overload conditions which could cause conductor overheating, but would go undetected if the long-time circuit was cleared every time the load dropped below the pickup setting or after every tripping event.

NOTE: Micrologic trip units are powered from the circuit to always provide fault protection. All other functions (display, metering, communications, etc.) require external power. See 15 for more information.

Figure 7: Long-Time Protection Switches

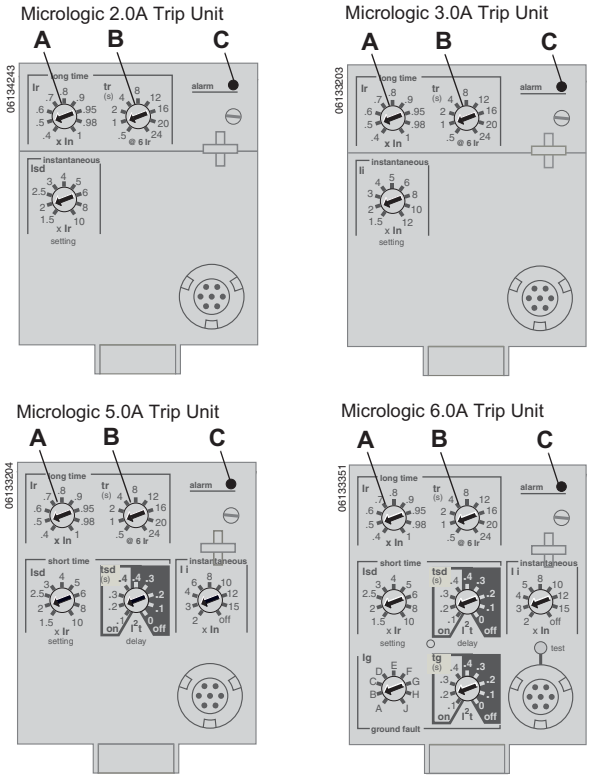

Table 1: Micrologic Trip Unit Long-Time Delay Values

Setting[1]	Long-Time Delay in Seconds[2]								
tr at 1.5 x Ir	12.5	25	50	100	200	300	400	500	600
tr at 6 x Ir	0.5	1	2	4	8	12	16	20	24
tr at 7.2 x Ir	0.34[3]	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6

[1]Ir = In x long-time pickup. In = sensor rating. Trip threshold between 1.05 and 1.20 Ir.
[2]Time-delay accuracy +0/-20%
[3]For Micrologic 5.0A and 6.0A trip units, when tsd is set to 0.4 on or 4.0 off, then tr = 0.5 instead of 0.34.

NOTE: If checking trip times, wait a minimum of 15 minutes after circuit breaker trips before resetting to allow the thermal imaging to reset completely to zero or use a full-function test kit to defeat the thermal imaging.

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Short-Time Protection

Short-time protection protects equipment against short circuits.

- Short-time protection is standard on 2.0A, 5.0A and 6.0A trip units. It is not available on 3.0A trip units.
- Short-time protection is based on the long-time pickup (Ir).
- The short-time pickup (Isd) (A) sets current level (below instantaneous trip level) at which circuit breaker will trip after the preset time delay.
- The short-time delay (tsd) (B) sets the length of time that the circuit breaker will carry an overcurrent above the short-time pickup current level before tripping. It is adjustable on the 5.0A and 6.0A trip unit and factory set to zero on the 2.0A trip unit.
- The I^2t on/I^2t off option provides improved selectivity with downstream protective devices:
  - — With I^2t off selected, fixed time delay is provided.
  - — With I^2t on selected, inverse time I^2t protection is provided up to 10 x Ir. Above 10 x Ir, fixed time delay is provided.
- Intermittent currents in the short-time tripping range which do not last sufficiently long to trigger a trip are accumulated and shorten the trip delay appropriately.
- Short-time protection can be zone-selective interlocked (ZSI) with upstream or downstream circuit breakers.
- Setting tsd to the 0 setting turns off zone-selective interlocking.
- Short-time protection uses true RMS measurement.
- Short-time pickup and delay can be adjusted to provide selectivity with upstream or downstream circuit breakers.

Figure 8: Short-Time Protection Switches

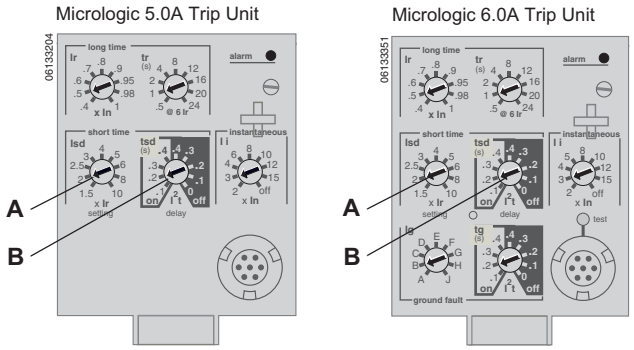

Table 2: Micrologic Trip Unit Short-Time Delay Values

Setting	Short-Time Delay				
I^2t off (Isd at 10 Ir) (seconds)	0	0.1	0.2	0.3	0.4
I^2t on (Isd at 10 Ir) (seconds)		0.1	0.2	0.3	0.4
tsd (min. trip) (milliseconds)	20	80	140	230	350
tsd (max. trip) (milliseconds)	80	140	200	320	500

NOTE: Use I^2t off with ZSI for proper coordination. Using I^2t on with ZSI is not recommended as the delay in the upstream device receiving a restraint signal could result in the trip unit tripping in a time shorter than the published trip curve.

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Instantaneous Protection

Instantaneous protection protects equipment against short circuits with no intentional time delay.

- Instantaneous protection (Ii) (A) is standard on the 3.0A, 5.0A and 6.0A trip units.
- Instantaneous protection on 2.0A trip units is achieved by using short-time protection (Isd) with the short-time delay factory set to 0 (zero).
- Instantaneous protection on the 3.0A, 5.0A and 6.0A trip units is based on the circuit breaker sensor rating (In).
- Instantaneous protection on the 2.0A trip unit is based on the long-time pickup setting (Ir).
- Circuit breaker open command is issued as soon as threshold current is exceeded.
- Instantaneous protection uses peak current measurement.
- When instantaneous protection switch is set to off, the instantaneous protection is disabled.

Figure 9: Instantaneous Protection Switches

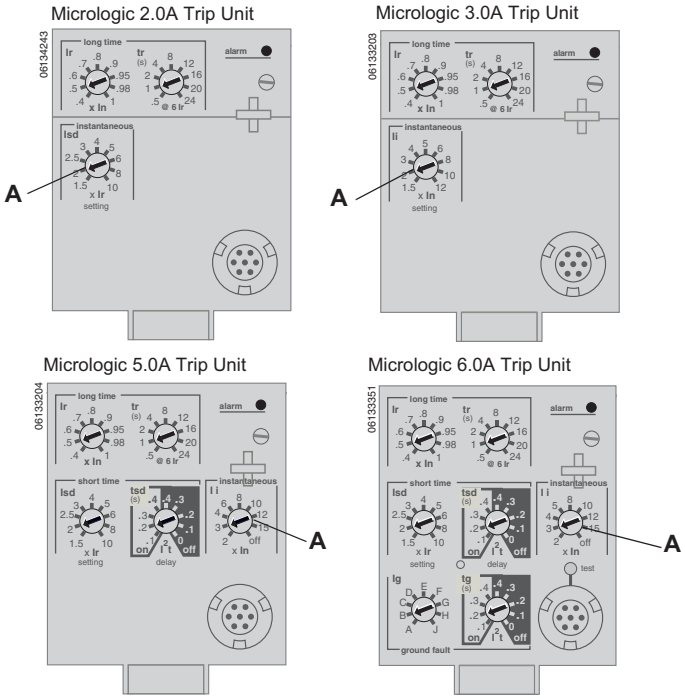

Table 3: Micrologic Instantaneous Values

Setting	Interruption Current								
2.0A Isd (= Ir x..)	1.5	2	2.5	3	4	5	6	8	10
3.0A Ii (= In x..)	1.5	2	3	4	5	6	8	10	12
5.0A Ii (= In x..)	2	3	4	6	8	10	12	15	off
6.0A Ii (= In x..)	2	3	4	6	8	10	12	15	off

Ii = UL and ANSI instantaneous
Isd = IEC instantaneous (short-time with zero delay)
In = sensor rating
Ir = long-time pickup

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Ground-Fault Protection

Equipment ground-fault protection protects conductors against overheating and faults from ground-fault currents (≤ 1200 A).

- Equipment ground-fault protection is standard on 6.0A trip units.
- Ground-fault pickup (Ig) (A) sets ground current level where circuit breaker will trip after the preset time delay.
- Ground-fault delay (tg) (B) sets the length of time that the circuit breaker will carry a ground-fault current above the ground-fault pickup current level before tripping.
- Equipment ground-fault protection can be zone-selective interlocked (ZSI) with upstream or downstream circuit breakers.
- Setting the ground-fault delay (tg) to the 0 setting turns off zone-selective interlocking.
- Neutral protection and equipment ground-fault protection are independent and can operate concurrently.

Figure 10: Ground-Fault Protection Switches

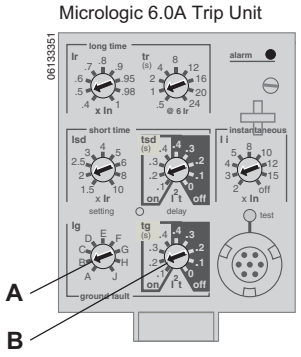


Table 4: Micrologic Trip Unit Ground-Fault Pickup Values

Ig (= In x....)	A	B	C	D	E	F	G	H	J
In ≤ 400 A	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
400 A < In ≤ 1200 A	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
In > 1200 A	500 A	640 A	720 A	800 A	880 A	960 A	1040 A	1120 A	1200 A

In = sensor rating.
Ig = ground-fault pickup.

Table 5: Micrologic Trip Unit Ground-Fault Delay Values

Setting	Ground-Fault Delay				
I^2t off (ms at In) (seconds)	0	0.1	0.2	0.3	0.4
I^2t on (ms at In) (seconds)	–	0.1	0.2	0.3	0.4
tsd (min. trip) (milliseconds)	20	80	140	230	350
tsd (max. trip) (milliseconds)	80	140	200	320	500

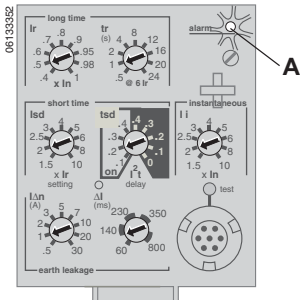
NOTE: Use I^2t off with ZSI for proper coordination. Using I^2t on with ZSI is not recommended as the delay in the upstream device receiving a restraint signal could result in the trip unit tripping in a time shorter than the published trip curve.

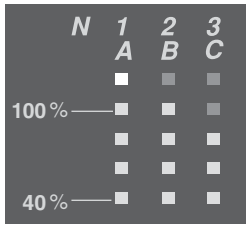
Indicator Lights

Overload Indicator Light

The overload indicator light (A) lights when the Ir long-time pickup level has been exceeded (over 100% on the bar graph).

Figure 11: Overload Indicator Light





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Trip Indicator Lights

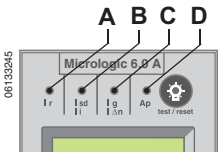
The Ir trip indicator light (A) lights when a trip occurs because the Ir long-time pickup level was exceeded.

The Isd/Ii trip indicator light (B) lights when a trip occurs because the Isd short-time pickup or the Ii instantaneous pickup was exceeded.

The Ig trip indicator light (C) lights when a trip occurs because the Ig ground fault pickup was exceeded.

The Ap self-protection indicator light (D) lights when the trip unit overheats, the instantaneous override level is exceeded, or a trip unit power supply failure occurs.

Figure 12: Trip Indicator Lights



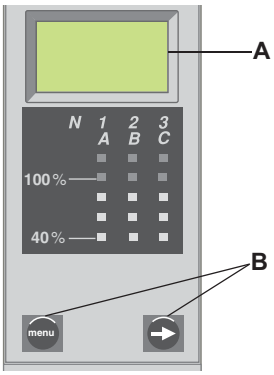
Ammeter

The ammeter monitors and displays the circuit breaker currents. An alphanumeric screen (A) continuously displays the phase at the highest load. Navigation buttons (B) can be pressed to display the various monitored currents.

The process of checking the ammeter values can be stopped at any time. After several seconds, Micrologic trip units automatically return to displaying the phase at the highest load.

See the following section for addition information concerning the ammeter.

Figure 13: Ammeter



Trip Unit Testing

Trip unit functions can be tested using primary injection testing or secondary injection testing.

Micrologic Trip Unit Configuration

Control Power

Table 6: Pickup Values

Sensor Plug Value (In)	Minimum Ground-Fault Pickup
100–250 A	30% of Sensor Rating
400–1200 A	20% of Sensor Rating
1600–6300 A	500 A

The A trip unit was designed to be used with or without an external 24 Vdc power supply.

The following will be powered and functional even if the trip unit is not externally powered:

- Fault protection for LSIG functions. The A trip unit is fully circuit powered for fault protection.
- LED trip indication (powered by an onboard battery). The battery's only function is to provide LED indication if all other power is off
- All display functions and trip unit features power-up with current flow on one phase greater than or equal to the values in Table 6.
- Ground-fault push-to-trip button works for testing ground fault with current flow on one phase greater than or equal to the values in Table 6.

The ground-fault push-to-trip is also functional if a Hand-Held Test Kit or Full-Function Test Kit is powering the trip unit.

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The following will be powered and functional with external power:

- All of the above functions which are functional without external power.
- Ammeter and bar graph displays are functional with or without current flowing through the circuit breaker. With current flow between 0 and 20% of sensor value, the ammeter may not be accurate.
- Trip settings and max. current readings can be accessed on the display be pressing the navigation buttons with or without current flowing through the circuit breaker.
- Ground-fault push-to-trip button works for testing ground fault with or without current flowing through the circuit breaker.
- Optional Modbus communications are functional, using a separate 24 Vdc power supply for the circuit breaker communications module. This separate 24 Vdc power supply is required to maintain the isolation between the trip unit and communications.

The ground-fault push-to-trip is also functional if a Hand-Held Test Kit or Full-Function Test Kit is powering the trip unit.

External Power Supply

⚠ CAUTION

HAZARD OF SHOCK, ARC FLASH OR EQUIPMENT DAMAGE

Trip unit and communication module must use separate power supplies.

Failure to follow this instruction can result in personal injury or equipment damage.

The trip unit display can be powered by a 24 Vdc external power supply.

Table 7: Power Supply Specifications

Function	Specification
Power for Trip Unit Alone	24 Vdc, 50 mA
Minimum Input-to-Output Isolation	2400 V
Output (Including Max. 1% Ripple)	±5%
Dielectric Withstand (Input/Output)	3 kV rms
Connections	Connections UC3 F1 (-) F2 (+) 24 Vdc

Power supply is used for graphic scree display when the circuit breaker is open or not carrying current.

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Section 2—Ammeter

Display

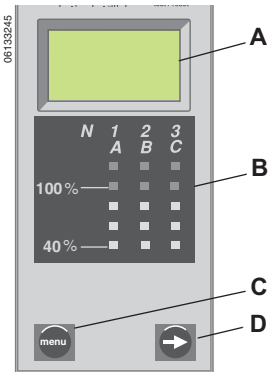
NOTE: The ammeter display will function only if the trip unit is powered. The trip unit is powered by the circuit breaker carrying more than 0.20 x In of load current, by being connected to a 24 Vdc external power supply, or by having the Full-Function Test Kit or Hand-Held Test Kit connected and on. Even with external power supplied, current through the circuit breaker must exceed 0.20 x In for the ammeter reading to be accurate to within 1.5%.

A. Alphanumeric screen: Displays ammeter information
B. Bar graph: Displays currents using an LED bar graph
C. Menu button: Used to navigate between the various menus
D. Scroll button: Used to scroll to the next screen in the menus

The default display is the current value of the phase at the highest load.

If no information is displayed, contact the local field office.

Figure 14: Ammeter



Ammeter Measurements

Micrologic A trip units measure the true RMS value of currents. They provide continuous current measurement from 0.2 to 20 x In with an accuracy of 1.5% (including sensors). No auxiliary source is needed where I > 0.2 x In. The optional external power supply (24 Vdc) makes it possible to display currents where I < 0.2 x In and to store values of the interrupted current.

A digital LCD screen continuously displays the most heavily loaded phases (Imax) or displays the Ia, Ib, Ic, Ig, and (on 4-pole circuit breakers only) In stored current and setting values by successively pressing the navigation button.

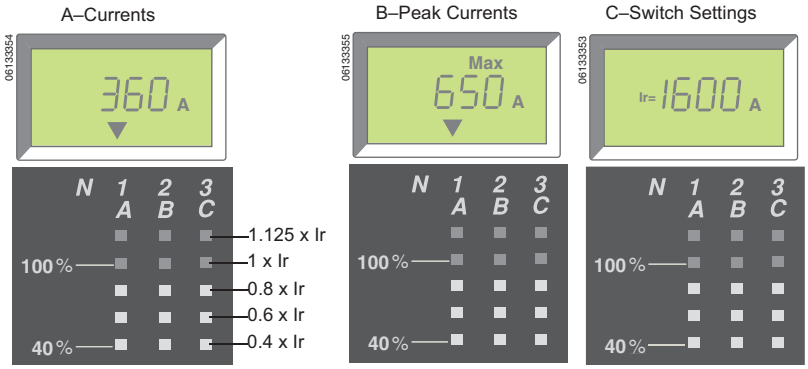
Accessing Information

Three different menus can be accessed:

A. Current measurements
B. Stored peak current measurements
C. Switch settings

In addition, the ammeter can be used to address the circuit breaker communication module (BCM) in circuit breakers which have the optional circuit breaker communication module installed.

Figure 15: Menus



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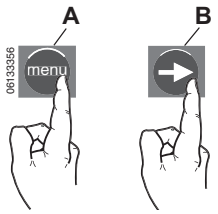
To access the next menu, press the menu button (A). To access the next screen in a menu, press the scroll button (B).

Figure 16: Navigation Buttons



Current Menu

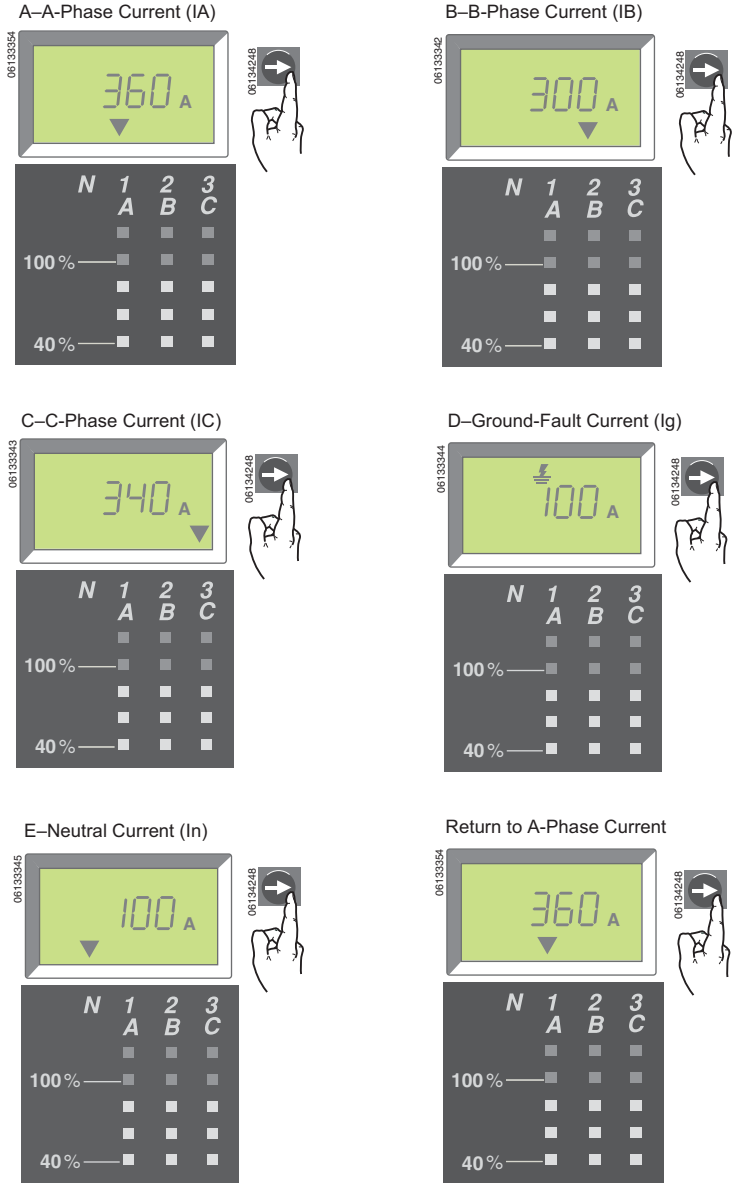
The current (default) menu displays:

A. Phase current (IA) in A phase
B. Phase current (IB) in B phase
C. Phase current (IC) in C phase
D. Ground-fault current (Ig) (Micrologic 6.0A trip units only)
E. Neutral current (In)

To display next current, press scroll button.

NOTE: Neutral current is only displayed with a 4-pole circuit breaker with the neutral protection set to half or full. Refer to bulletin 48041-082-03 for NC CT wiring guidelines.

Figure 17: Current Menus



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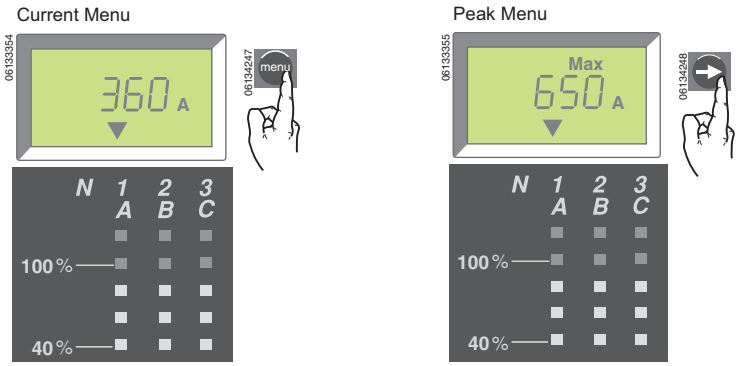
Peak Menu

To access the peak menu:

1. Current menu is displayed.
2. Press menu button.
3. Peak menu appears.

To access menu screens, press scroll button.

Figure 18: Access the Peak Menu



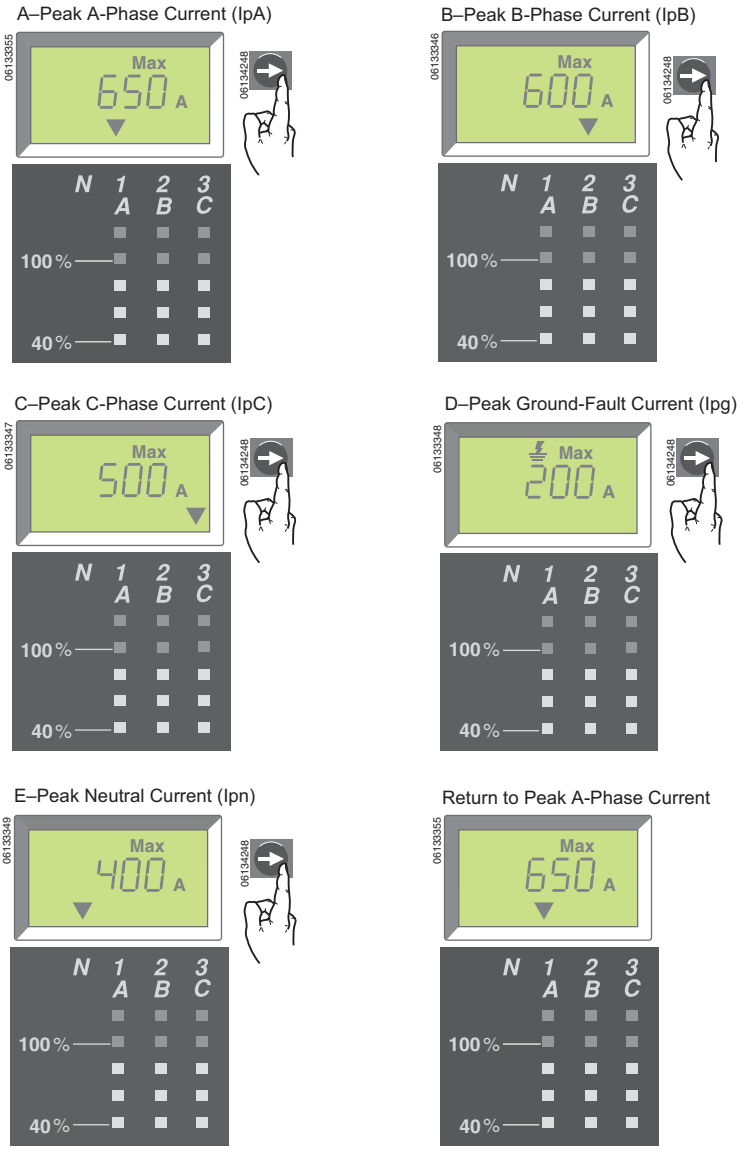
The peak menu displays:

A. Peak current (IpA) in A phase
B. Peak current (IpB) in B phase
C. Peak current (IpC) in C phase
D. Peak ground-fault current (Ipg) (Micrologic 6.0A trip unit only)
E. Peak neutral current (Ipn)

To display next peak current, press scroll button.

To reset a max value, scroll to the particular max value screen to be reset and hold the scroll button for three seconds.

Figure 19: Peak Menus



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Switch Settings Menu

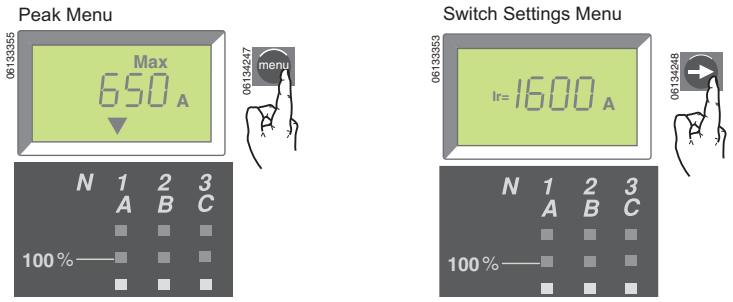
The switch settings menu displays the values at which the switches are set.

To access the switch settings menu:

1. Peak menu is displayed.
2. Press menu button.
3. Switch settings menu will appear.

To access menu screens, press scroll button.

Figure 20: Access the Switch Settings Menu

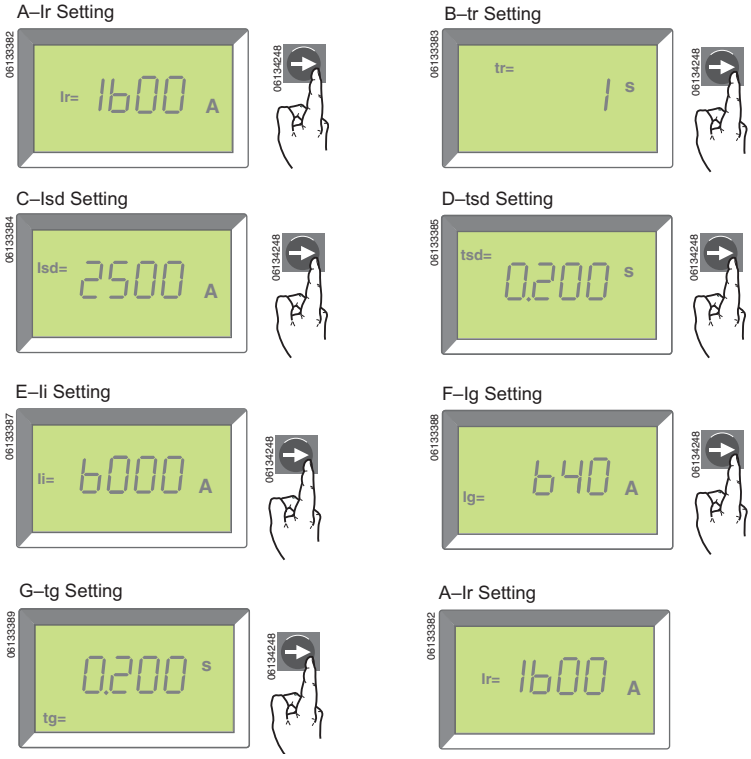


The switch settings menu displays:

A. Long-time pickup (Ir) setting
B. Long-time delay (tr) setting
C. Short-time pickup (Isd) setting
D. Short-time delay (tsd) setting
E. Instantaneous pickup (Ii) setting
F. Ground-fault pickup (Ig) setting (6.0A trip units only)
G. Ground-fault delay (tg) setting (6.0A trip units only)

To display next switch setting, press scroll button.

Figure 21: Trip Unit Switch Settings

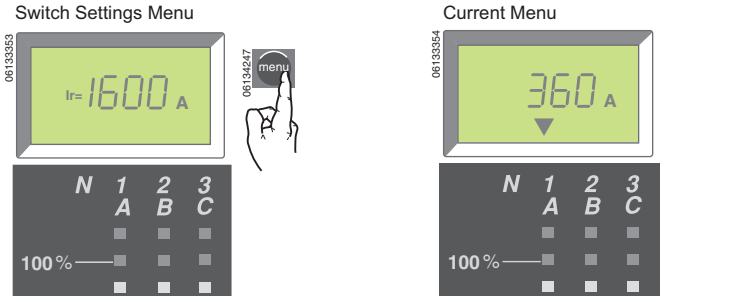


To return to the current menu:

1. Switch settings menu is displayed.
2. Press menu button.
3. Current menu will appear.

Or wait several seconds and ammeter will automatically return to the current (i.e., default) menu.

Figure 22: Return to Current Menu



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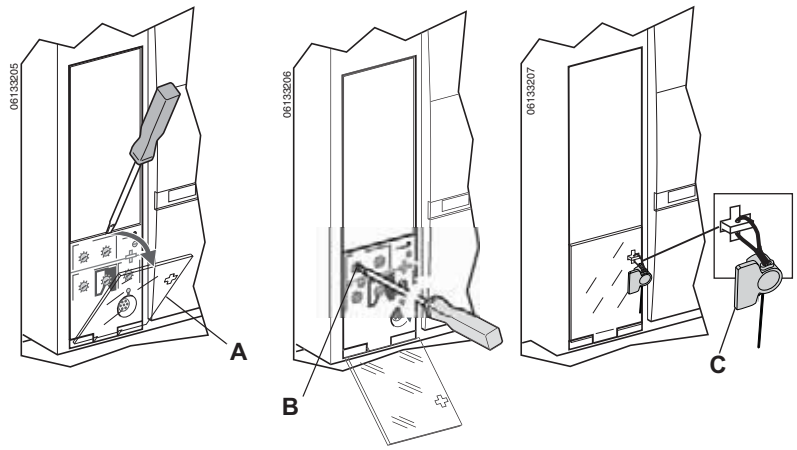
Section 3—Operation

Switch Setting Adjustment

1. Open switch cover (A).
2. Adjust the appropriate switches (B) to desired values.
3. Replace switch cover. Use wire seal MICROTUSEAL (C, not provided), if necessary, to provide tamper evidence.

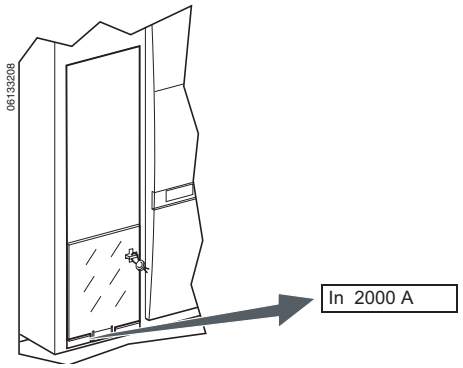
Figure 23: Adjust Switch Settings



Examples

Circuit breaker is rated 2000 A.

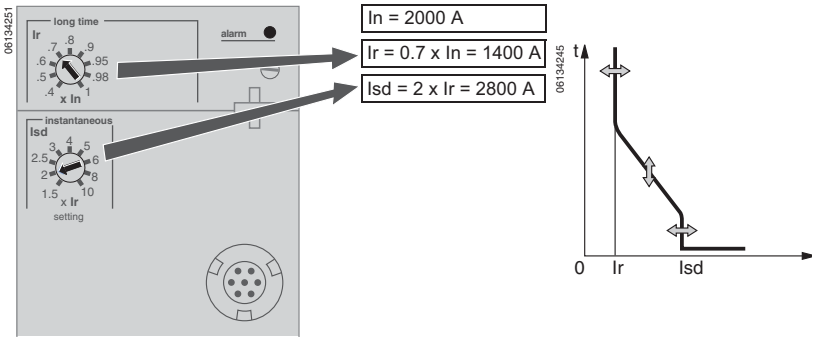
Figure 24: Circuit Breaker Rating



Micrologic 2.0A Trip Unit

1. Set pickup levels.

Figure 25: Set Pickup Levels



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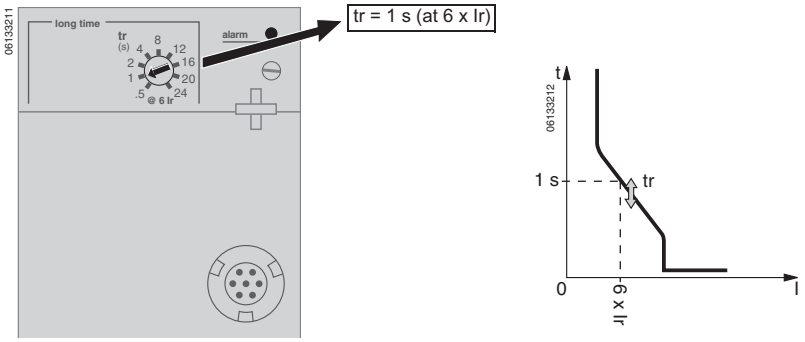
2. Set time delay.

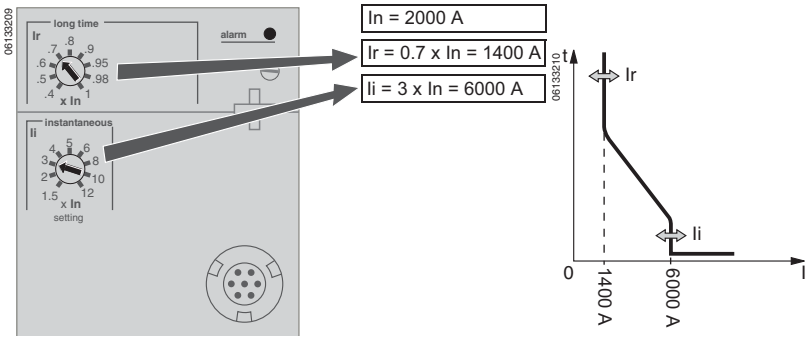
Figure 26: Set Time Delay



Micrologic 3.0A Trip Unit

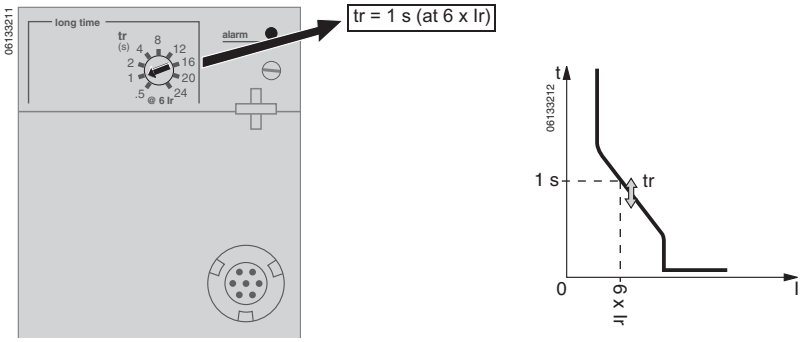
1. Set pickup levels.

Figure 27: Set Pickup Levels



2. Set time delay.

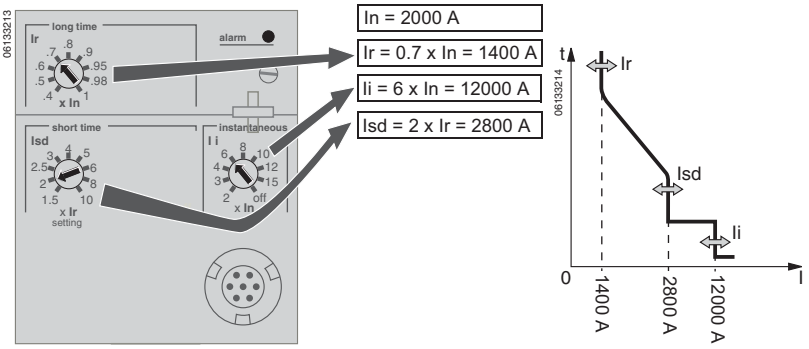
Figure 28: Set Time Delay



Micrologic 5.0A Trip Unit

1. Set pickup levels.

Figure 29: Set Pickup Levels



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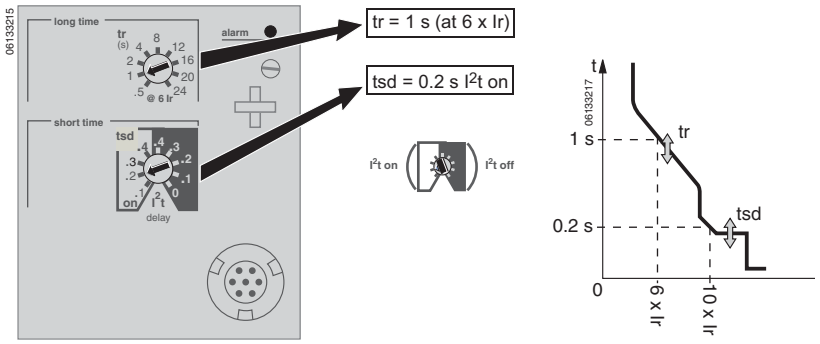
2. Set time delay.

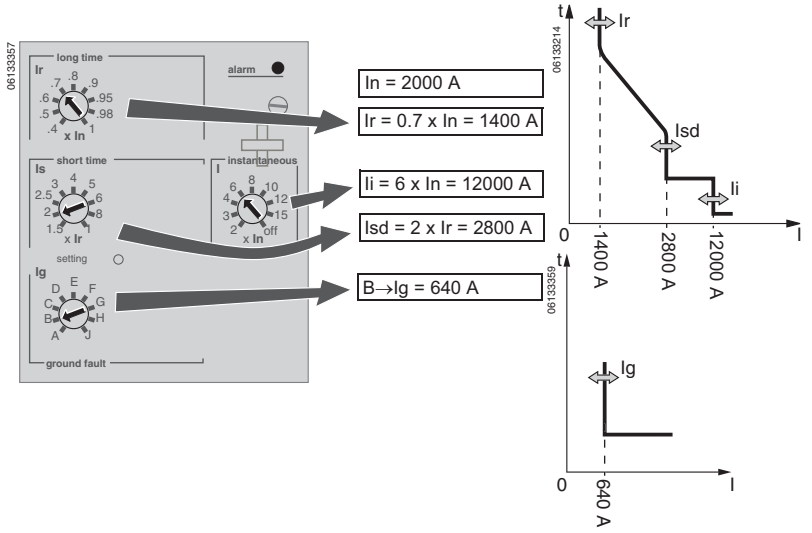
Figure 30: Set Time Delays



Micrologic 6.0A Trip Unit

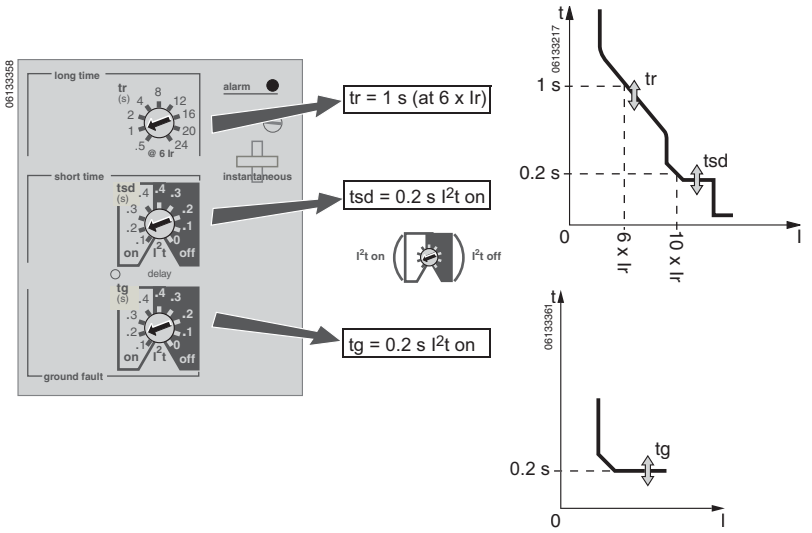
1. Set pickup levels.

Figure 31: Set Pickup Levels



2. Set time delays.

Figure 32: Set Pickup Levels



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Zone-Selective Interlocking (ZSI)

The number of devices which can be interlocked are shown in Table 8.

Table 8: ZSI Combinations

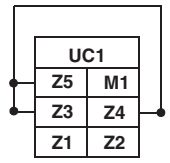
Upstream Device (receives input from RIM) → / Downstream Device (sends output to RIM) ↓	Micrologic #.0x Trip Units	Square D Micrologic Series B Trip Units	Square D GC-100 Ground-Fault Relay for Equipment Protection	Square D GC-200 Ground-Fault Relay for Equipment Protection	Merlin Gerin STR58 Trip Units	Federal Pioneer USRC and USRCM Trip Units
Micrologic #.0x Trip Units	15	R	R	15	15	R
Square D Micrologic Series B Trip Units	R	26	R	R	R	15
Square D GC-100 Ground-Fault Relay for Equipment Protection	R	R	7	R	R	R
Square D GC-200 Ground-Fault Relay for Equipment Protection	15	R	R	15	15	R
Merlin Gerin STR58 Trip Units	15	R	R	15	15	R
Merlin Gerin STR53 Trip Units	15	R	R	15	15	R
Federal Pioneer USRC and USRCM Trip Units	R	15	R	R	R	15
Square D Add-On Ground Fault Module for Equipment Protection	R	5	R	R	R	R

R—RIM module is required to restrain any devices.

Numerical References—Maximum number of upstream circuit breakers which can be restrained without requiring a RIM Module.

Circuit breaker terminals are shipped with terminals Z3, Z4 and Z5 jumpered to self-restrain the short-time and ground-fault functions. Remove the jumpers when activating zone-selective interlocking.

Figure 33: Jumpered Terminals



Auxiliary Connections

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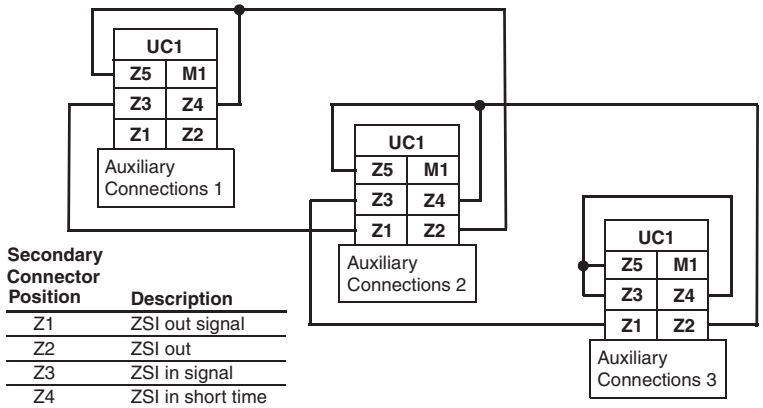
Wire circuit breakers for zone-selective interlocking.

Figure 34: ZSI Wiring Example



Secondary Connector Position	Description
Z1	ZSI out signal
Z2	ZSI out
Z3	ZSI in signal
Z4	ZSI in short time
Z5	ZSI in ground fault

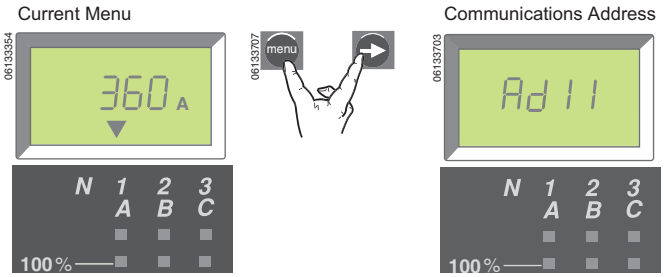
Communication Module values

If the optional circuit breaker communication module (BCM) is installed, use the ammeter to set communication module values.

To access the communication module menu:

1. Current menu is displayed.
2. Simultaneously press both menu button and scroll button down for three seconds.
3. Communication module addressing menu will appear.

Figure 35: Access Communication Module Menu



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Set communication module values:

1. Press and release scroll button to sequence addresses (1 through 47). When the correct address number is reached, enter the value by pressing and holding scroll button until the display stops flashing.

   Baud rate screen will appear after address has been entered.

2. Press and release scroll button to sequence baud rates (4.8k, 9.6k or 19.2k). When the desired baud rate appears, enter the value by pressing and holding scroll button until the display stops flashing.

   Parity screen will appear after baud rate has been entered.

3. Press and release scroll button to sequence parities (E [even] or n [none]). When the desired parity appears, enter the value by pressing and holding scroll button until the display stops flashing.

   Languages screen will appear after parity has been entered.

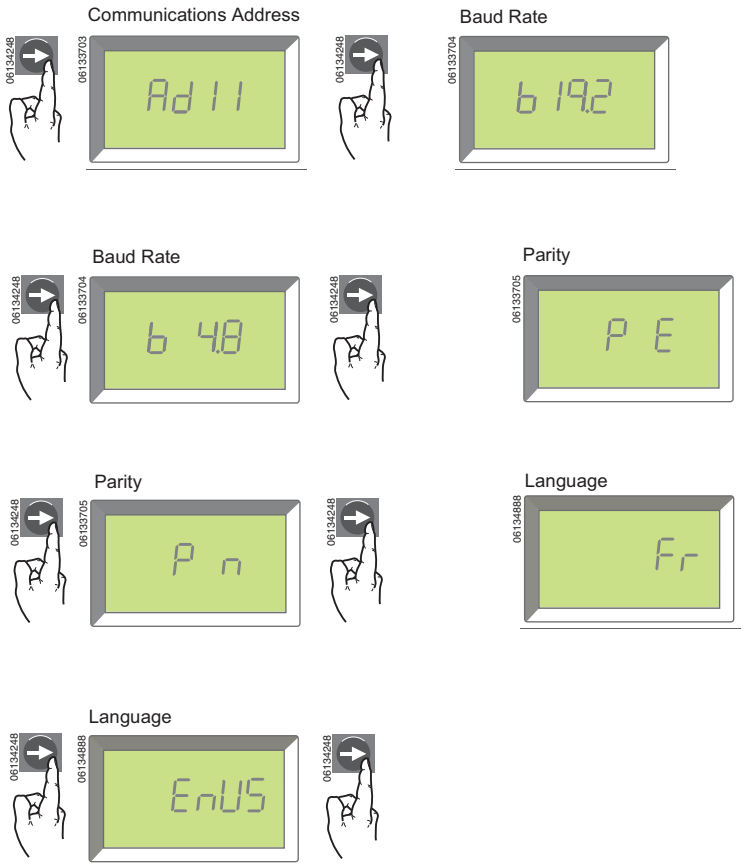
4. Press and release scroll button to scroll through languages (French [Fr], US English [En US], UK English [En], German [d], Spanish [SP] or Italian [It]). When the desired language appears, enter the value by pressing and holding scroll button until the display stops flashing.

   Ammeter display will return to the default screen after language is entered.

After the communication module values have been set, ammeter will automatically return to the current (i.e., default) menu.

After setting circuit breaker communication module values, drawout circuit breakers must have the cradle communication module, if available, activated. For drawout circuit breakers, refer to the cradle communication module instructions to complete setup.

Figure 36: Set Communication Module Values



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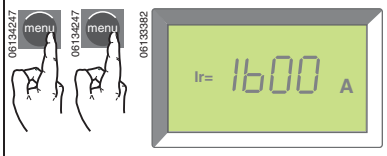
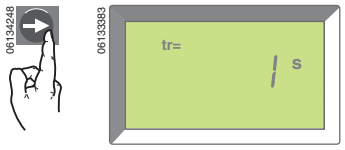
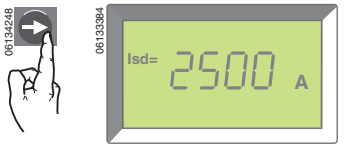
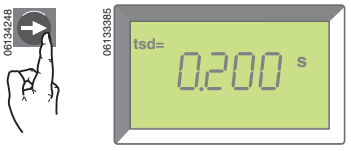
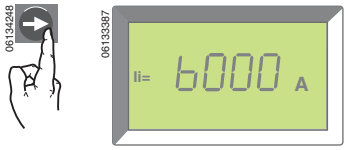
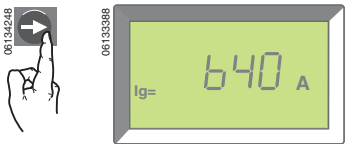
Trip Unit Settings Check

Use the ammeter switch setting menu to check the trip unit settings.

1. Press menu button twice.
2. Switch settings menu will appear.
3. Press scroll button to advance to next screen.
4. After checking trip unit settings, press menu button once to return to main menu.

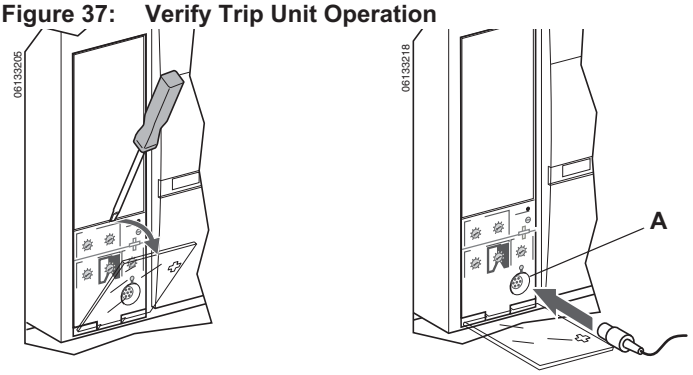
Table 9: Trip Unit Settings

Setting		Window	2.0A	3.0A	5.0A	6.0A
Ir	Long-Time Pickup		X	X	X	X
tr	Long-Time Delay		X	X	X	X
Isd	Short-Time Pickup		X		X	X
tsd	Short-Time Delay				X	X
Ii	Instantaneous Pickup			X	X	X
Ig	Ground-Fault Pickup					X
tg	Ground-Fault Delay					X

Trip Unit Operation Verification

Use a test kit connected to the trip unit test plug receptacle (A) to verify trip unit is functioning as desired. See instructions shipped with test kit to perform verification tests.

Figure 37: Verify Trip Unit Operation



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Equipment Ground-Fault Trip Functions Testing

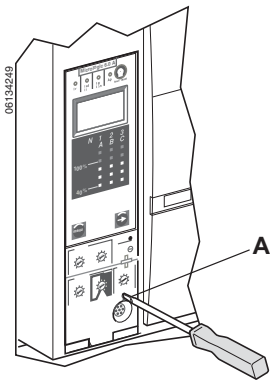
Paragraph 230-95 (c) of the National Electrical Code requires that all equipment ground-fault protection systems be tested when first installed.

With the circuit breaker closed, test the ground-fault (Micrologic 6.0A trip unit only) trip functions. For instructions on how to close circuit breaker, refer to the circuit breaker installation instructions shipped with the circuit breaker.

1. Press the ground-fault test button (A). Circuit breaker should trip.
2. If circuit breaker does not trip, contact the local field office.

NOTE: Trip unit must be powered to test ground-fault trip function. The trip unit is powered if the circuit breaker is carrying more than 0.20 x In of load current, if the 24 Vdc external power supply is connected or if the Full-Function Test Kit or Hand-Held Test Kit is connected and on.

Figure 38: Test Equipment Ground-Fault Trip Function



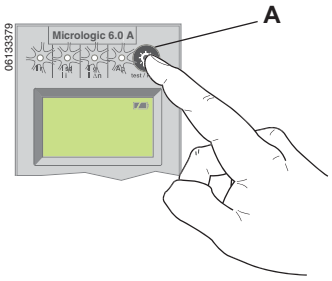
Trip Unit Resetting

When the circuit breaker trips, the fault indicator will remain lit until the trip unit is reset.

Press the reset/test button (A) to reset the trip unit after trip.

Do not return circuit breaker to service until cause of trip is determined. For more information, refer to the circuit breaker installation instructions shipped with the circuit breaker.

Figure 39: Reset Trip Unit



Trip Unit Status Check

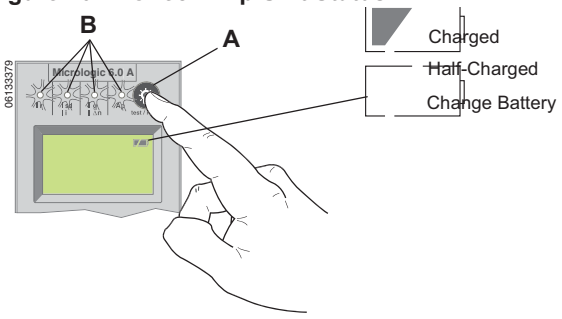
To check trip unit battery and trip indicators, press the test/reset button (A).

- All trip indicators (B) will light up
- Battery status will be displayed
- If no battery status is displayed, there is no battery installed.
- The battery bar graph reading is valid after the reset button has been released.
- If the battery bar graph shows the battery needs to be changed, use Square D battery catalog number S33593:
  - — lithium battery
  - — 1.2AA, 3.6 V, 800 ma/h

For instructions on replacing battery, see Section 6—Battery Replacement.

NOTE: Trip unit must be powered to test battery. The trip unit is powered if the circuit breaker is carrying more than 0.20 x In of load current, if the 24 Vdc external power supply is connected or if the Full-Function Test Kit or Hand-Held Test Kit is connected and on.

Figure 40: Check Trip Unit Status



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Section 4—Trip Unit Replacement

Trip unit replacement must be done by qualified persons, as defined by the National Electric Code, who are familiar with the installation and maintenance of power circuit breakers.

Before replacing trip unit, confirm that the circuit breaker is in good working condition. If the condition of the circuit breaker is unknown, do not proceed. For assistance in evaluating the condition of the circuit breaker, call Technical Support.

Read this entire section before starting the replacement procedure.

NOTE: If trip unit being replaced is a Micrologic 2.0, 3.0 or 5.0 trip unit, order connector block S33101 and circuit breaker or cradle wiring harness if necessary.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Failure to follow these instructions for installation, trip test and primary injection testing may result in the failure of some or all protective function.
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- Replacement/upgrading of a trip unit in the field must be done by qualified persons, as defined by the National Electric Code, who are familiar with the installation and maintenance of power circuit breakers.
- Before replacing/upgrading trip unit, confirm that the circuit breaker is in good working condition. If the condition of the circuit breaker is unknown, do not proceed. For assistance in evaluating the condition of the circuit breaker, call Technical Support.
- If the circuit breaker fails to function properly in any manner upon completion of the trip unit installation, immediately remove the circuit breaker from service and call Field Services.
- Turn off all power supplying this equipment before working on or inside equipment. Follow instructions shipped with circuit breaker to disconnect and reconnect circuit breaker.
- Replace all devices, doors and covers before returning equipment to service.

Failure to follow this instruction will result in death or serious injury.

Required Tools

- Torque-controlled screwdriver, set at 7 in-lbs (0.8 N•m) ± 10% (Lindstrom torque driver MAL500-2 or equivalent)
- Micrologic Full-Function Test Kit (part number S33595)

Preparation

Record Switch Settings

Record all trip unit switch settings for later use.

Circuit Breaker Disconnection

Disconnect circuit breaker as directed in the circuit breaker instruction bulletin shipped with the circuit breaker. The circuit breaker must be completely isolated. (For a drawout circuit breaker, place circuit breaker in the disconnected position. For a fixed-mounted circuit breaker, all voltage sources, including auxiliary power, must be disconnected.)

Circuit Breaker Accessory Cover Removal

Remove circuit breaker accessory cover as directed in the Install Accessories section of the circuit breaker instruction bulletin shipped with the circuit breaker.

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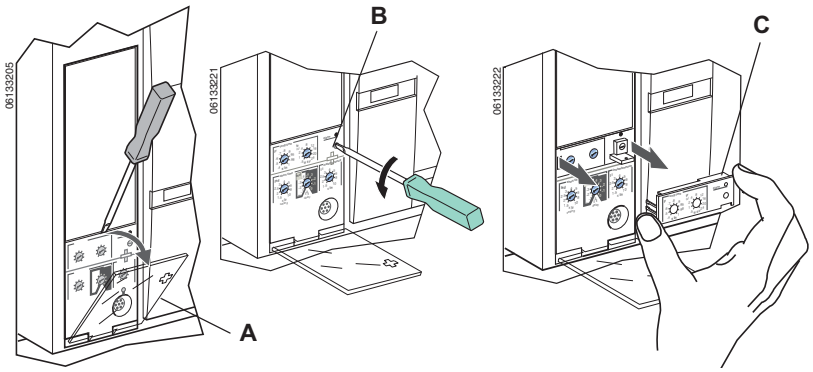
Rating Plug Removal

A small Phillips screwdriver is needed to remove the adjustable rating plug.

1. Open switch cover (A).
2. Unscrew adjustable rating plug mounting screw (B).
3. Remove adjustable rating plug (C). Save for installation in replacement trip unit.

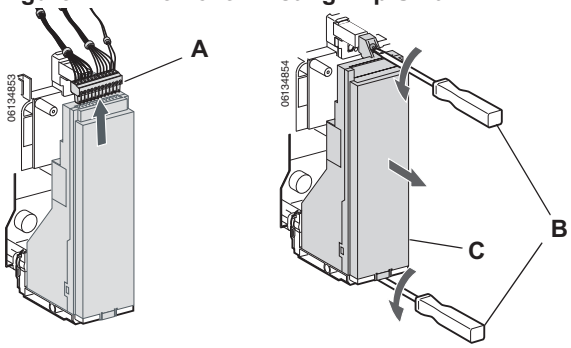
Figure 41: Remove Adjustable Rating Plug



Trip Unit Removal

1. Remove connector block (A) from top of trip unit, if present.
2. Loosen two trip unit screws (B).
3. Slide out trip unit (C).

Figure 42: Remove Existing Trip Unit



Trip Unit Replacement

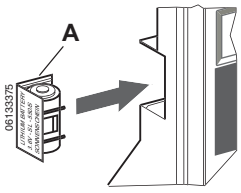
Battery Installation

If a new trip unit is being installed, install the trip unit battery.

Install battery holder with battery (A) in trip unit, observing the correct polarity as indicated on the battery compartment.

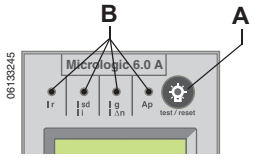
NOTE: Battery holder with battery is located under the side flap in the cardboard box the trip unit is shipped in.

Figure 43: Install Battery



Press test/reset button (A). All four indicator lights (B) should light. If they do not light, check polarity of battery and retest. If indicator lights still do not light up when test/reset button is pressed, stop installation and contact the local sales office for factory authorized service

Figure 44: Trip Indicator Lights



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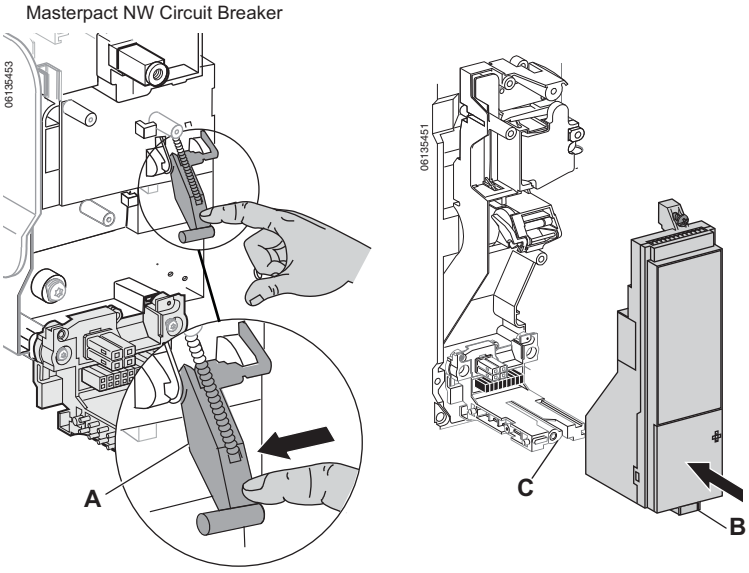
Trip Unit Installation

1. Inspect trip unit connector pins and surfaces. If there is any damage, misaligned pins, or contamination, stop installation and contact the local sales office for factory authorized service.
2. Inspect trip unit mounting base on the circuit breaker. Clear any debris from area and check that all accessory wiring is properly routed for the trip unit being installed. If there is any damage or contamination, stop installation and contact the local sales office for factory authorized service.
3. For Masterpact NW circuit breaker only: Manually depress trip unit interlock (A) and hold it in place during steps 4–6 below.
4. Align guide rail (B) on bottom of trip unit with guide rail slot (C) on trip unit mounting base in circuit breaker and gently slide the trip unit in until it stops.

NOTE: The Masterpact NT and NW trip unit mounting bases are shock mounted and therefore can flex slightly.

Figure 45: Install Trip Unit



NOTICE

HAZARD OF EQUIPMENT DAMAGE

Check installation of trip unit to assure proper connections and seating.

Failure to follow this instruction can result in equipment damage or improper circuit breaker tripping.

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5. Align the trip unit so top mounting screw (A) aligns with the top threaded insert and start the screw by turning the screw two full rotations.
6. Use a torque-controlled screwdriver to drive the bottom screw (B) to 7 in-lbs (0.8 N•m) ± 10%. The back of the trip unit must be flush with the trip unit mounting base.
7. Use a torque-controlled screwdriver to drive the top screw to 7 in-lbs (0.8 N•m) ± 10%. Mounting tab must be flush with the mounting standoff and sensor plug.

NOTE: The face of the closed switch cover must be flush with adjoining mounting base surfaces. If these surfaces are not flush, stop installation and contact the local sales office for factory authorized service.

NOTE: If you are upgrading from a Micrologic 2.0, 3.0 or 5.0 trip unit, the connector block must be ordered separately (Part Number S33101). See instructions shipped with the connector block for installation into circuit breaker.

8. Install connector block (C) into top of trip unit.
9. Install adjustable rating plug into the trip unit.
   a. Open switch cover (A) on new trip unit.
   b. Inspect mounting area for debris and contamination.
   c. Gently push adjustable rating plug (B) into new trip unit.
   d. Tighten adjustable rating plug mounting screw (C). The plug will be drawn into position flush with front face as screw is tightened.
10. Set trip unit switches to values recorded above or per coordination study results.
11. Close switch cover (A).

Figure 46: Install Trip Unit

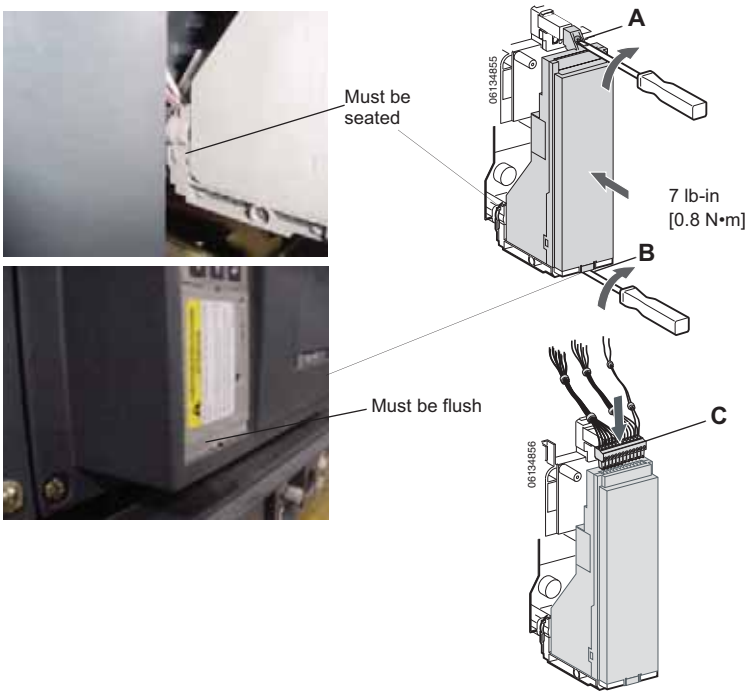
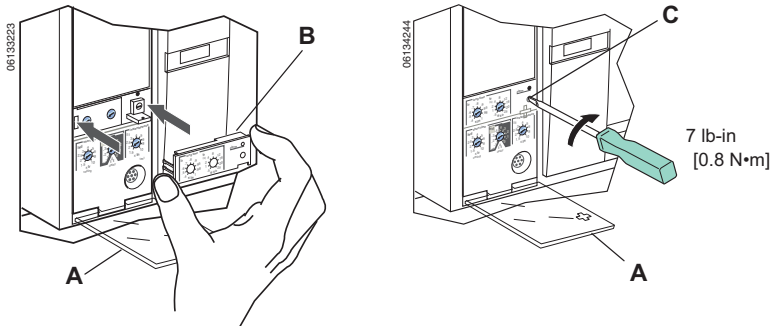


Figure 47: Install Adjustable Rating Plug



Circuit Breaker Accessory Cover Replacement

Replace circuit breaker accessory cover as directed in the Install Accessories section of the circuit breaker instruction bulletin shipped with the circuit breaker.

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Trip Unit Installation Check

Secondary Injection Testing

Field installation of a trip unit requires secondary injection testing with the Full-Function Test Kit. to ensure that the newly-installed trip unit is functioning properly. The test will require opening and closing the circuit breaker. Follow the procedures outlined in the instruction bulletins shipped with the circuit breaker and the test kit.

1. Make sure the circuit breaker is isolated from all upstream and downstream devices.
2. Perform secondary injection testing as outlined in the instruction bulletin shipped with the test kit. Verify that all applicable trip unit functions are operating properly.
3. Repeat step 2 with the circuit breaker in the open position.

   NOTE: The test kit states that the circuit breaker should be closed when performing the test. Do not close the circuit breaker for this step.
4. If any test fails, do not put the circuit breaker into service and contact the local sales office for factory authorization service.

Primary Injection Testing

Primary injection testing is recommended to ensure that all trip system connections have been correctly made. Perform primary injection testing per the instructions in the Field Testing and Maintenance Guide, bulletin number 0600IB1201.

Check Accessory Operation

1. Installed accessories – Validate the proper operation of all installed accessories. See the corresponding accessory instruction bulletins for operational testing procedures.
2. Zone selective interlocking – If the circuit breaker is part of a ZSI system, follow the zone selective interlocking test procedures as outlined in the Full Function Test Kit instruction bulletin.
3. Communications – If communication modules exist, validate circuit breaker has re-established communications with the supervisor.

Trip Unit Setup

1. If an auxiliary power supply is being used for the Micrologic trip unit, reconnect the auxiliary power supply.
2. Reset the trip unit switches to original values, as recorded at the beginning of this section.

Circuit Breaker Reconnection

Reconnect circuit breaker as directed in the circuit breaker instruction bulletin shipped with the circuit breaker.

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Section 5—Adjustable Rating Plug Replacement

NOTE: To select correct replacement rating plug, see the product catalog.

NOTE: If adjustable rating plug is removed, the circuit breaker will default to a long-time pickup rating of 0.4 x In and a long-time delay at whatever setting was selected before the rating plug was removed.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

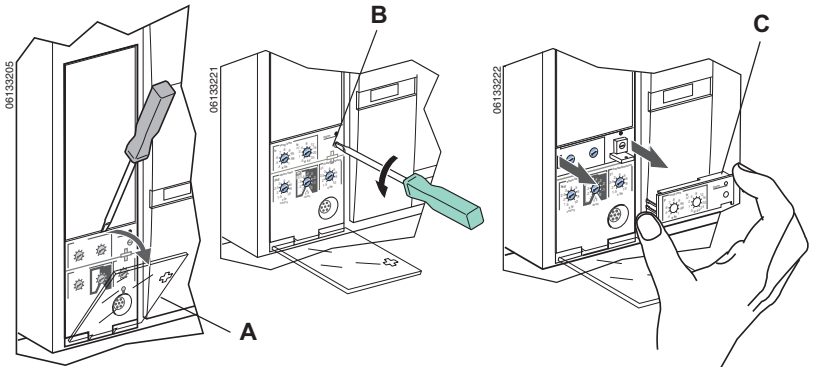
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment. Follow instructions shipped with circuit breaker to disconnect and reconnect circuit breaker.
- Replace all devices, doors and covers before returning equipment to service.

Failure to follow this instruction will result in death or serious injury.

Rating Plug Removal

1. Open circuit breaker contacts:
   - — For Masterpact NT and NW circuit breakers, press the “Push to open” button on the circuit breaker.
   - — For other circuit breakers, move handle to the off (O) position.
2. Open switch cover (A).
3. Unscrew adjustable rating plug mounting screw (B).
4. Remove adjustable rating plug (C).

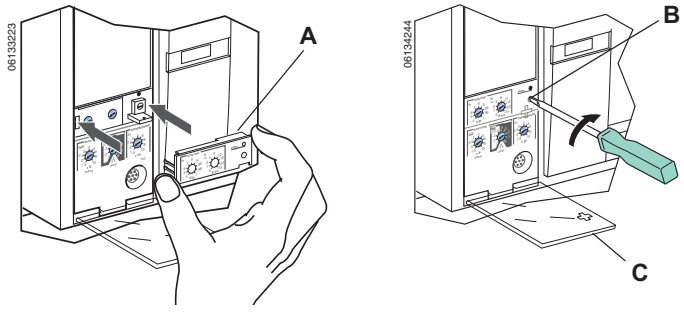
Figure 48: Remove Adjustable Rating Plug



New Rating Plug Installation

1. Inspect mounting area for debris and contamination.
2. Gently push in new adjustable rating plug (A).
3. Tighten adjustable rating plug mounting screw (B).
4. Set the switches on the trip unit (see Section 3 —Operation).
5. Close switch cover (C).

Figure 49: Install New Adjustable Rating Plug



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Section 6—Battery Replacement

Circuit Breaker Disconnection

Disconnect circuit breaker as directed in the circuit breaker instruction bulletin shipped with the circuit breaker.

Circuit Breaker Accessory Cover Removal

Remove circuit breaker accessory cover as directed in the Install Accessories section of the circuit breaker instruction bulletin shipped with the circuit breaker.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment. Follow instructions shipped with circuit breaker to disconnect and reconnect circuit breaker.
- Replace all devices, doors and covers before returning equipment to service.

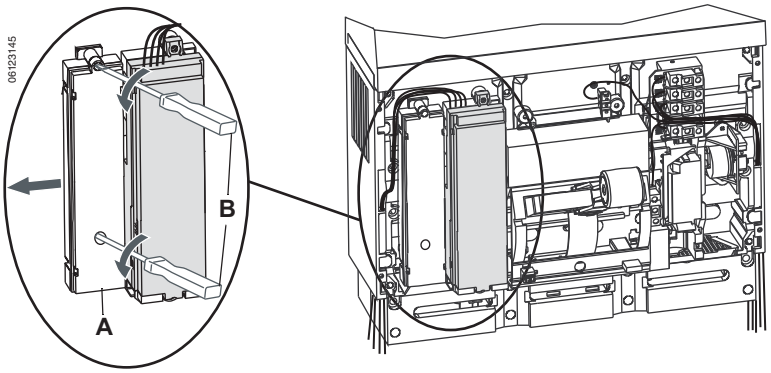
Failure to follow this instruction will result in death or serious injury.

Withstand Module Shifting

NOTE: R-frame and NS1600b–NS3200 circuit breakers only.

Loosen screws (A) securing withstand module (B). Swing module to side to access trip unit battery cover. Do not remove withstand module connector.

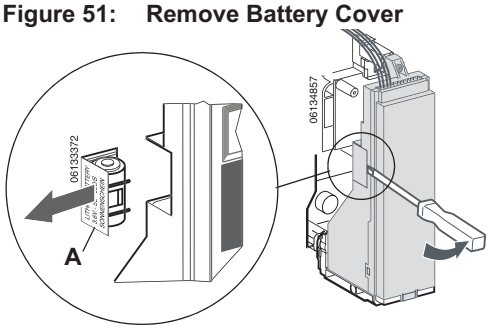
Figure 50: Shift Withstand Module



Battery Replacement

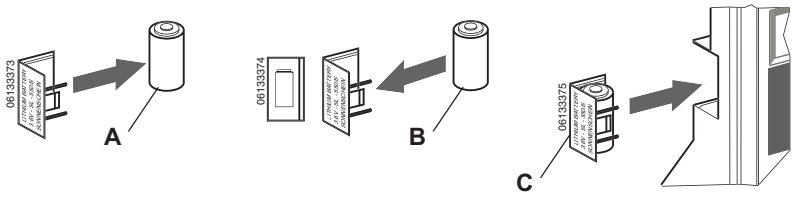
1. Insert small screwdriver blade into battery housing cover notch and rotate to slide battery housing cover (A) out of trip unit.

Figure 51: Remove Battery Cover



2. Remove battery (A).
3. Insert new battery (B). Make sure that the polarity is correct.
4. Replace battery housing cover (C).

Figure 52: Replace Battery



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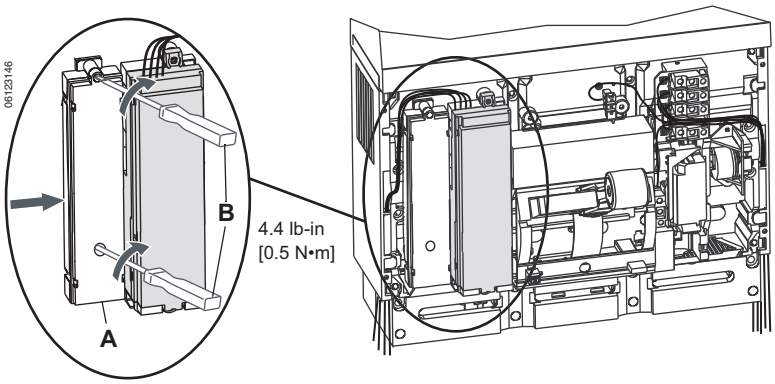
Withstand Module Replacement

NOTE: R-frame and NS1600b–NS3200 circuit breakers only.

Replace withstand module (A). Tighten screws (B) securing withstand module.

Figure 53: Replace Withstand Module



Circuit Breaker Accessory Cover Replacement

Replace circuit breaker accessory cover as directed in the Install Accessories section of the circuit breaker instruction bulletin shipped with the circuit breaker.

Circuit Breaker Reconnection

Reconnect circuit breaker as directed in the circuit breaker instruction bulletin shipped with the circuit breaker.

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Appendix A—Register List

List of Registers

The quantities are listed in alphabetical order according to the SMS topic name.

NOTE: A system scan rate of 500 ms or greater is recommended to minimize communications timeout issues.

This is an abbreviated list of registers. For a complete list of registers, contact your local sales office.

To access available registers, the following address scheme applies.

Module	Module Name	Equation	Address Range
BCM	Circuit Breaker Communication Module	--	1–47
CCM	Cradle Communication Module	BCM + 50	51–97
PM	Protection Module (Internal to trip unit)	BCM + 100	101–147
MM	Meter Module (Internal to trip unit)	BCM + 200	201–247

Table 10: Register List

SMS Topic Name	User Description	Number of Registers*	Register*	Module*†	Units	Scale/Bitmask
810DBrkrStatus	Circuit Breaker Status	1	661	BCM		Bit 0; ON = closed, OFF = open
810DBrkrTripStat	Circuit Breaker Trip Unit Status	1	661	BCM		Bit 2; ON = tripped, OFF = not tripped
BCM_SN	BCM Serial Number	4	516	BCM		ASCII text
BkrPos	Circuit Breaker Position	1	661	CCM		Bit 8 = disconnected Bit 9 = connected Bit 10 = test position
DT_3Regs	Device Clock Date/Time	3	679	BCM		3-register date/time format‡
EnableCloseBkr	Remote Closing Enabled	1	669	BCM		Bit 2; ON = enabled, OFF = not enabled
EnableOpenBkr	Remote Opening Enabled	1	669	BCM		Bit 1; ON = enabled, OFF = not enabled
EnableRemCtrl	Remote Control Enabled	1	669	BCM		Bit 3; ON = auto (enabled), OFF = manual (not enabled)
IA	Current A	1	8821	PM	A	Unity
IA_PCT	Current A % Load	1	8837	PM	%	Unity
IB	Current B	1	8822	PM	A	Unity
IB_PCT	Current B % Load	1	8838	PM	%	Unity
IC	Current C	1	8823	PM	A	Unity
IC_PCT	Current C % Load	1	8839	PM	%	Unity
IG	Current G	1	8825	PM	A	Unity
IG_PCT	Current G % Load	1	8841	PM	%	Unity
IG_PCT_VIGI	Current G (VIGI) % Load	1	8842	PM	%	Hundredths
IG_VIGI	Current G (VIGI)	1	8826	PM	A	Thousandths
IMax	Current Max Present	1	8820	PM	A	Unity
IN	Current N	1	8824	PM	A	Unity
IN_PCT	Current N % Load	1	8840	PM	%	Unity
LDPUValue	Long Delay Pickup Value	2	8756	PM	A	Modulo 10,000 format**
MaxIA	Max Current A	1	8827	PM	A	Unity
MaxIB	Max Current B	1	8828	PM	A	Unity
MaxIC	Max Current C	1	8829	PM	A	Unity
MaxIG	Max Current G	1	8831	PM	A	Unity
MaxIG_VIGI	Max Current G (VIGI)	1	8832	PM	A	Thousandths
MaxIN	Max Current N	1	8830	PM	A	Unity
NominalCurrent	Circuit Breaker Nominal Current	1	8750	PM	A	Unity
ReadyToClose	Circuit Breaker Ready to Close	1	661	BCM		Bit 5; ON = yes, OFF = no

Continued on next page

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Table 10: Register List *(continued)*

SMS Topic Name	User Description	Number of Registers*	Register*	Module*†	Units	Scale/Bitmask
TU_BATT_PCT	Trip Unit % Battery	1	8843	PM	%	Unity
TU_SN	Trip Unit Serial Number	4	8700	PM		ASCII text
TUCommStatus	Trip Unit Internal Comms Status	1	552	BCM		Bit 11; ON = not responding, OFF = OK

* For register entries that are not listed, please refer to the Micrologic device type register list. Contact your local sales office.

† BCM = Circuit breaker communication module. CCM = Cradle communication module. PM = Trip unit protection module.

‡ 3-register date/time format: register 1: month (byte 1) = 1–12, day (byte 2) = 1–31; register 2: year (byte 1) = 0–199 (add to 1900 to determine the actual year), hour (byte 2) = 0–23; register 3: minutes (byte 1) = 0–59, seconds (byte 2) = 0–59. Note: Bits 14 and 15 of the month/day register must be masked.

** Modulo 10,000 format: 1 to 4 sequential registers. Each register is Modulo 10,000 (range = –9,999 to +9,999). Result is [R4*10,000^3 + R3*10,000^2 + R2*10,000^1] + R1. Range is zero to 9,999,999,999,999,999.

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